



Michigan Technical Note

USDA-Natural Resources Conservation Service

Agronomy #38

Subject: Establishment of Vegetative Sod Strips in Greenhouse for Use in Vegetative Barriers

Date: November, 2008

Purpose:

Provide instruction on construction of frames and establishment of vegetative “sod strips” in a greenhouse or similar environment. Vegetative sod strips are used to create vegetative barriers for erosion control in concentrated water flow areas.

There are several conservation practices available to address soil erosion from concentrated water flow in agricultural and non-cropland fields. Grassed waterways have been used to hold soil in concentrated flows and direct water off an in-field watershed with minimal soil loss. However, grassed waterways require the landowner to take a significant portion of a field out of agricultural production.

Vegetative Barrier is another conservation practice that can address soil erosion in concentrated water flow areas. Criteria and considerations for planning and establishing a vegetative barrier in a field are described in NRCS Conservation Practice Standard 601 – Vegetative Barrier. This practice uses narrow strips of vegetation planted across a concentrated flow area to trap sediment, stabilize slopes, manage water flow, and reduce soil erosion. This practice has been effective in reducing soil erosion and stabilizing slopes in concentrated flow areas (Temple and Dabney, 2001; Douglas and Mason, 1996; Meyer et al., 2001)

Vegetative barriers may be established vegetatively or from seed. Advantages of vegetative establishment are known plant density at time of establishment, plants that are visibly present throughout the growing season (for weed management), and faster effectiveness as a vegetative barrier compared to establishment from seed. The Vegetative Barrier Standard describes vegetative establishment by using bareroot seedlings, cuttings, sod chunks, plugs, rhizomes, or divisions consisting of at least 5 viable stems (NRCS Vegetative Barrier Standard 601).

The Rose Lake Plant Materials Center evaluated Vegetative Barrier establishment by seeding and various vegetative methods. Installation of vegetative material by plugs provided better vegetative barrier effectiveness than seeding, but heavy rains, especially during the establishment year, caused soil erosion that was not contained by the barriers (Burgdorf et al., 1990 – 2000).

The Rose Lake Plant Materials Center developed a novel method of creating vegetative barriers in vegetative “sod strips” in the greenhouse that can be transferred to the field as plant and soil conditions allow. These sod strips have proven more effective as vegetative barriers, especially in the establishment year, compared to other vegetative establishment methods. The following is a description of how to produce vegetative sod strips, for vegetative barriers, in a greenhouse.

Materials and Methods:

1. **Frame construction:** A wood frame is constructed on a greenhouse table. Wooden boards 1.5-inch thick x 7.5-inch wide (2x8) are placed around the perimeter of the table. Corners are reinforced by installing “L” brackets on each corner. A 0.75-inch thick wooden board is installed across the center of the frame to provide support for the side boards when metal wire is stretched tightly across the frame. Metal wire (14 gauge) is stretched across the frame at 3-inch intervals. The wire is secured to the frame using wire staples (Figure 1).
2. **Liner installation:** A two-part liner system is installed to create pockets 3-inches wide and 6-feet long. The first layer is a 4-mil (thickness) plastic sheet installed over the wire and down to the base of the frame. Small holes are made in the plastic to facilitate drainage. The second layer is a coconut fiber (coir) erosion control fabric (BioD-SCF 30, RoLanka International, Inc) that follows the same pattern as the plastic sheet (Diagram 1).
3. **Planting media:** A thin layer (0.25 – 0.5 inch) of sand is applied evenly across the bottom of each pocket. This allows for water drainage and helps shape the pockets. A peat-based growing media is added to each pocket until the media level is at, or just below the top of the pocket (Diagram 1).
4. **Vegetative material:** Dormant crowns of *Miscanthus sinensis* are divided into single vegetative units with at least one live growing point. Each crown is inserted in the soil media of each pocket at 3-inch intervals. The crowns are inserted so that the top of the crown is at, or just below the media surface. Stem material from the previous growing season is visible above the media surface (Figure 2).
5. **Growing conditions:** The greenhouse growing conditions are established to provide daytime temperatures of 75 – 80° F, and nighttime temperatures of 55 – 60° F. Supplemental light is provided to create a 12-h light/12-h dark lighting regime. Overhead irrigation is applied as needed to provide adequate soil moisture for the plants. Irrigation amount and intervals are adjusted over the course of the growing cycle to accommodate changes in growth of the plants. Plants are grown under these conditions for approximately 6 months to allow for root development and creation of “sod strips” in the pockets (Figure 3).
6. **Excavation of sod strips:** The vegetative material is removed from the greenhouse 24-h before installation in the field. The plastic and coconut fiber layers are cut at each wire using an electric knife. (Other knives, scissors, and shears were effective in cutting the layers as well.) The roots of the *Miscanthus* plants intertwined with the coconut fiber and provided a stable sod strip that could be moved with little risk of the strip falling apart. The sod strips, including the plastic layer, are moved out of the greenhouse (Figure 4).

Additional Considerations:

1. **Plant species selection:** Select plant species that will form a well-established root system and meet the stem strength and density characteristics described in Vegetative Barrier Standard 601.
2. **Coconut fiber fabric selection:** Use coconut fiber considered a durable coir temporary mat (RoLanka International, Inc.) composed of a layer of mattress coir stitched between two synthetic nets with polypropylene threads. Do not use semi-permanent blankets, such as products woven from bristle coir twines, as they are difficult to install in the frames and difficult to cut when the sod strips are excavated.
3. **Layer placement:** Place the plastic and coconut fiber fabric in the pockets so the ends of the pocket are covered. This will minimize water damage to the wooden frames and prevent roots of adjacent sod strips from getting tangled with each other at the ends of the pockets.
4. **Pocket width determination:** Use a pocket width of 3 inches because the sod strips will be inserted into a trench that is 4 inches wide. Pocket width can be adjusted based on the size of the trench.

References:

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- Meyer, L. D., S. M. Dabney, and W. D. Kemper. 2001. Designing Research to Improve Runoff and Erosion Control Practices: Example, Grass Hedges. Pages 447 – 451. In: D. E. Stott, R. H. Mohtar, and G. C. Stenhardt (eds). 2001. Sustaining the Global Farm.
- Natural Resources Conservation Service. 2001. Vegetative Barrier Conservation Practice Standard 601. National Handbook of Conservation Practices.
- RoLanka International, Inc. Stockbridge, GA. NOTE: Any reference to trade names or manufacturers is for example only. This should not be considered an endorsement of RoLanka International or specific products from RoLanka.
- Temple, D. M. and S. M. Dabney. 2001. Grass Hedges to Catch Runaway Soil. Agricultural Research/October 2001, p 21.

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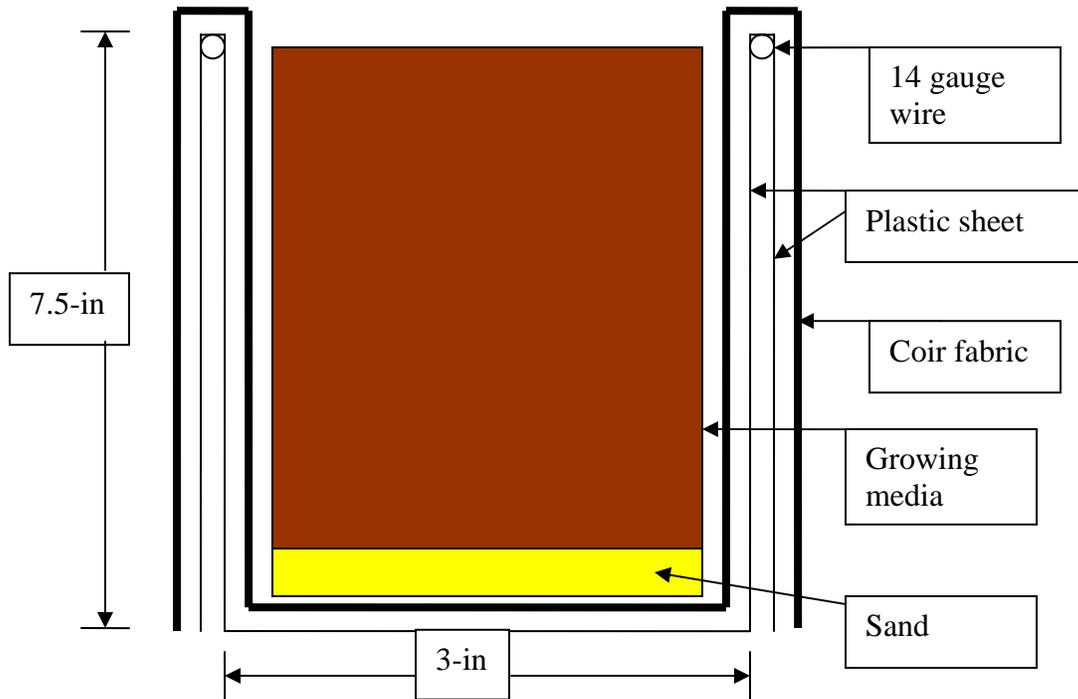


Diagram 1. Cross Section of Pocket



Figure 1. Metal wire stretched across wooden frame with plastic sheet draped over the wires creating a “pocket” which will receive a coir fabric and planting media.



Figure 2. *Miscanthus sinensis* vegetative material planted at 3 inch intervals within each vegetative sod strip pocket. Growing point positioned below media surface. Stem material from previous growing season visible.



Figure 3. Top - Single *Miscanthus sinensis* sod strip 6 months after planting.
Bottom - *Miscanthus sinensis* sod strips growing on greenhouse table 6 months after planting.



Figure 4. *Miscanthus sinensis* sod strip, with plastic layer, removed from growing frame on greenhouse table.